

**WAVEGUIDE INCLUDING AT LEAST ONE PHOTONIC CRYSTAL  
REGION FOR DIRECTING SIGNALS PROPAGATING  
THERE THROUGH**

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**ABSTRACT OF THE DISCLOSURE**

A waveguide assembly is provided that includes a waveguide region and at least one photonic crystal (PhC) region. The waveguide region includes a longitudinally extending core that has an input channel and at least one output channel, and a cladding at least partially surrounding the core for confining signals within the core. The PhC region(s), in turn, extend laterally through at least a portion of the core to at least partially direct signals propagating through the core. The PhC region(s) can extend through at least a portion of the core to thereby form, for example, a bend, beamsplitter, polarizing beamsplitter, Mach-Zender interferometer or ring resonator for signals propagating through the core.

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